DOCUMENT RESUME

ED 032 792 EM 007 481

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Use of Student Performance Data for Improvement of Individualized Instructional Materials.

American Institutes for Research, Palo Alto, Calif.; Westinghouse Learning Corp., New York, N.Y.
Spons Agency-American Psychological Association, Washington, D.C.
Pub Date 1 Sep 69
Note-27p.; Proceedings of a Symposium, American Psychological Assn., Washington, D.C., Sept. 1, 1969
EDRS Price MF-$0.25 HC-$1.45
Descriptors-*Academic Performance, Computers, *Data Analysis, Educational Strategies, Evaluation Techniques, *Feedback, *Individualized Instruction, Instructional Materials, Learning Activities, *Program Improvement, Public Schools, Reading Instruction, Science Instruction, Sequential Approach, Sequential Learning
Identifiers-PLAN, *Program for Learning in Accordance with Needs

The Program for Learning in Accordance with Needs (PLAN) was devised to be self-improving through a system of computer analysis of student performance data. The PLAN instructional program consists of teaching-learning units in various subject areas, such as reading and science, which are composed of self-paced alternative learning activities, objectives, and criterion tests. Two types of student performance data related to specific objectives (derived from statistics for the number of students selecting each option on tests, frequency distributions of student scores on an objective by objective basis, and on a unit by unit basis, and cross validation data on parallel items) and subjective teacher and student judgements. Examination and analysis of these data by computer reveal whether a unit needs refinement or not; if it does, the data can reveal the difficulty, whether it is a lack of consistency in activities and objectives between learning, a poorly stated problem, inappropriate sequencing of learning activities, or lack of student understanding of the presentation format. (SP)

ED032792

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USE OF STUDENT PERFORMANCE DATA FOR IMPROVEMENT OF INDIVIDUALIZED INSTRUCTIONAL MATERIALS *

Harold F. Rahmlow

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Introduction

PLAN is a computer-supported system of individualized education dedicated to the improvement of educational results. Because PLAN is concerned with educational results, there is a strong emphasis on student performance data as the primary source of corrective feedback. There is continued effort toward improvement of the system, and the improvement is based on information gathered from the field.

This paper describes some of the kinds of data used in the improvement of the PLAN program and illustrates the improvement procedure with examples in the areas of science and reading.

* Presented as part of a symposium: Project PLAN: a computer-supported individualized education program for Division 15, American Psychological Association, Washington, D. C., September 1, 1969

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Background

PLAN (a Program for Learning in Accordance with Needs) is a joint effort of the American Institutes for Research, Westinghouse Learning Corporation, and thirteen participating school districts to improve education in grades 1 — 12. The combination of public schools, a research organization, and a major industrial concern provides tremendous resources which can be brought to bear upon the problem of education. Previous papers (1, 2, 6) provide detailed background information on the project.

The basic building block in PLAN is the module, which includes objectives associated with recommended learning activities, and criterion tests. A guidance system uses student data and draws upon a bank of modules available to recommend an individualized program of studies for each student. This program of studies is individualized on both the number and type of objectives the student studies. The program is further individualized by providing alternate teaching-learning strategies, Teaching-Learning Units (TLU's) for some modules.

A central computer is used in PLAN to collect information from a simple terminal located in each of the participating schools and to process this information for future use of teachers and the research staff.

A correlated teacher education project is working on the problems of the functions of teachers in an individualized education system.

Types of Data

The data base for the improvement of instructional results can be divided into two categories: hard data (objective) and soft data (subjective). In the hard data category we utilize four different test records: (1) item statistics of module tests indicating the number of students selecting each option; (2) frequency distribution of student scores on module tests on an objective-by-objective basis; (3) frequency distribution of student scores on module tests on an objective-by-objective-by-TLU basis; and (4) cross-validation data on parallel items administered at various time intervals.

It was mentioned that learning activities and evaluation items are written to specific performance objectives. Because of this principle, in analyzing items it is possible to pinpoint the validity with respect to the objectives as well as the reliability of items. A portion of an item analysis sheet is shown in Figure 1. The data are typical in that they indicate the frequency of student response for the various items and the correct response as well as providing in the right-hand column certain item-difficulty information. Although the specific objective to which each item is related is not shown in Figure 1, an alternate document provides the key to the item analyzer.

If revisions of the learning activities are to lead to more effective learning, it is important to be able to relate the learner's activities to his achievement of a specific objective. This is accomplished primarily by comparing the activities

Figure 1

Module 30-254

CHOICE OF OPTIONS FOR TEST ITEMS						**ITEM DIFFICULTY LEVELS**			
ITEM NO.	A	B	C	D	E	(-PASS	(-SR	(-TC	(-NP
01	021	020	099*	040	000	054	071	055	021
02	027	007	003	144*	000	079	100	078	058
03	002	010	170*	000	000	093	100	097	073
04	011	033	030	107*	000	059	079	065	006
05	023	130*	009	020	000	071	075	071	058
06	003	027	145*	007	000	080	100	078	061
07	005	004	005	168*	000	092	100	098	064
08	051	112*	017	002	000	062	088	057	039
09	120*	052	010	000	000	066	088	065	039
10	006	156*	009	011	000	086	100	090	055
11	004	173*	003	002	000	095	100	099	076
12	150*	015	013	000	000	082	100	087	045

TOTAL NUMBER OF TEST RECORDS0 0182
NUMBER OF COMPLETE CASES0 0015
NUMBER OF S REVIEW CASES00 0024
NUMBER OF T CERTIFY CASES0 0110
NUMBER OF NOT PASSED CASES0 0033

indicated by the student as completed and the results of the criterion test items. If it is found, for example, that none of the activities leads to satisfactory performance, or that completion of a particular activity appears to attenuate performance, this information triggers a careful look at the module and the test.

Figure 2 shows an example of the objective-by-objective data. The printout shows the frequencies, percentages, and cumulative percentages of student responses on each of the evaluation items related to the given objective. Means and standard deviations are also included. The manner in which these data are used in module revision will be illustrated shortly.

On any given set of objectives, it is very likely that more than one teaching-learning unit will be offered from which the student can choose the method he will use to accomplish the objective. Because there are alternate approaches to the same terminal behaviors, it is desirable to be able to differentiate between the effectiveness of the various methods. To this end, information on the relative performance of the various teaching-learning units is provided. Figure 3 illustrates data available on alternate teaching-learning units which seek to facilitate the acquisition of the same student performance. Although it is not shown in Figure 3, it is also possible to examine data for different sub-populations to determine the differential effect, if any, of different TLU's upon the various sub-populations. A point biserial correlation is computed for each item as related to the overall items for the objective and can provide useful information. However, as indicated by Popham (3), such traditional indicators

Figure 2

PROJECT PLAN - PROGRAM P1302 - ES68-113 - FREQUENCY DISTRIBUTION OF OBJECTIVES

MODULE NUMBER 30-312-0-01-0 NUMBER OF OBJECTIVES THIS MODULE 5

TOTAL NUMBER OF STUDENTS 232

Objective Code	No. of Items Correct	Frequency	Percent	Cumulative Percent
4182	00	0	0.0	0.0
	01	5	2.2	2.2
	02	17	7.3	9.5
	03	26	11.2	20.7
	04	24	10.3	31.0
	05	160	69.0	100.0
TOTALS		232	100.0	
MEAN				4.37
STANDARD DEVIATION				1.07

Objective Code	Number of Items Correct	Frequency	Percent	Cumulative Percent
4183	00	1	0.4	0.4
	01	12	5.2	5.6
	02	39	16.8	22.4
	03	70	30.2	52.6
	04	110	47.4	100.0
TOTALS		232	100.0	
MEAN				3.19
STANDARD DEVIATION				0.92

Figure 3

MODULE 31-645, TEST NO. 1, TLU 2, OBJECTIVE 7617, N = 115, MEAN = 4.548, S. D. = 1.410

ITEM		ALTERNATES					
		A	B	C	D	E	BLK
1	FREQUENCY	4	85	6	13	5	2
	PROPORTION	0.035	0.739	0.052	0.113	0.043	0.017
	MEAN	3.500	5.082	2.833	2.692	3.800	3.000
	PT. BIS. R	-0.142	0.641	-0.287	-0.472	-0.114	-0.147
2	FREQUENCY	3	7	4	87	12	2
	PROPORTION	0.026	0.061	0.035	0.757	0.104	0.017
	MEAN	2.333	2.714	3.000	5.034	3.583	2.000
	PT. BIS. R	-0.258	-0.333	-0.209	0.611	-0.235	-0.242
3	FREQUENCY	1	2	101	8	3	0
	PROPORTION	0.009	0.017	0.878	0.070	0.026	0.000
	MEAN	2.000	2.500	4.762	3.500	2.333	0.000
	PT. BIS. R	-0.170	-0.194	0.411	-0.204	-0.258	0.000
4	FREQUENCY	102	6	3	0	4	0
	PROPORTION	0.887	0.052	0.026	0.000	0.035	0.000
	MEAN	4.794	2.667	3.000	0.000	2.250	0.000
	PT. BIS. R	0.492	-0.314	-0.181	0.000	-0.311	0.000
5	FREQUENCY	24	12	0	79	0	0
	PROPORTION	0.209	0.104	0.000	0.687	0.000	0.000
	MEAN	3.333	3.417	0.000	5.089	0.000	0.000
	PT. BIS. R	-0.444	-0.275	0.000	0.571	0.000	0.000
6	FREQUENCY	6	69	19	21	0	0
	PROPORTION	0.052	0.600	0.165	0.183	0.000	0.000
	MEAN	3.167	5.261	3.632	3.429	0.000	0.000
	PT. BIS. R	-0.231	0.622	-0.290	-0.377	0.000	0.000

of item effectiveness can be very misleading in mastery-type learning situations. For this reason, it is desirable to examine the raw data as well as the correlation coefficient itself.

It is recognized that different competencies are evaluated on a short-term test as compared to a long-term test. In PLAN the module test whose item analysis we have been examining above is considered short term. That is, the module test is designed to measure student performance gained over an approximately two-week period. However, PLAN Achievement Tests and Developed Ability Tests are two other tests designed to assess student performance over a longer period of time. By comparing student results on the short- and long-range tests, it is possible to ascertain not only the immediate results of student activity, but also the long-range retention and synthesis of concepts. Figure 4 indicates survey test (a PLAN Achievement Test) data collected.

In addition to the hard data discussed above, observational and teacher-observed behavior is also recorded. Figure 5 shows a portion of the questions asked of the teacher about the TLU's. This information, when used in conjunction with the item-analysis data mentioned above, provides valuable clues on the possible improvement of the program. Figure 6 illustrates a portion of the information relative to evaluation instruments that was collected from teachers.

Because PLAN is being developed for students, it is very valuable to collect student-response information on their perception of the program. Figure 7

Figure 4

TABLE 15 (continued)

A Comparison of the Items That Appeared in Both the Module Tests and the Survey Tests

84-543

Civics Survey Test - 9th Grade

Survey Test Item No.	Module Test	Module Test Item No.	Percent Passing Module Item	Percent Passing Corresponding Survey Item	Percent Difference	One or More of the Alternates Were Changed	Position of Alternates Changed	Developmental Item	Appears on PLAN Achievement Test	Remarks
[11.	44-543	23	61	67	+6	X				[
[11.	44-623	23	67	67	0	X				[Item stem also changed somewhat.
[11.	44-583	23	52	67	+15	X				[
[12.	44-543	25	68	78	+10				X	No change
[12.	44-623	25	62	78	+16				X	No change
13.	44-544	1	97	96	-1					No change
14.	44-544	4	77	72	-5				X	No change
15.	44-544	8	77	76	+1					No change
16.	44-544	9	67	64	-3					No change
17.	44-545	7	77	71	-6				X	No change
18.	44-545	20	84	83	-1		X			Small format change

Note.--The brackets indicate that the item appears in more than one module test.

(Table continued on next page.)

Figure 5

PORTION OF TEACHER'S TLU EVALUATION FORM

TLU Overall Evaluation

A. The objectives are not sequenced correctly.

B. TLU requires extensive teacher help.

C. TLU needs a greater variety of learning activities.

D. Reading level of TLU itself is too difficult for my (better, average, poor) students. (Select appropriate one for comment.)

E. Please revise as indicated on the attached copy of the TLU.

F. TLU should be deleted from the program. (Why?)

G. There is not enough difference in TLU's. (How should they be modified?)

Student Activities

A. Acceptable.

B. Activities not related to the objective, or they are irrelevant to overall development.

C. Objective needs additional activities as indicated on the form or on attached TLU in order to prepare students adequately for the achievement of the objective.

D. The activities are not in the correct sequence. Please revise as on the form or on the attached TLU.

E. Activities require extensive teacher help.

F. Too much reading required.

Figure 6

PORTION OF TEACHER'S TEST EVALUATION FORM

A. Needs to be written in simpler language for the student. (Indicate vocabulary or structure causing difficulty.)

B. Does not appear to be related to any of the objectives of the module.

C. Format of item was confusing — needed teacher explanation.

D. Answers are ambiguous — no real distinction at the child's level of understanding.

E. Insufficient information is given in the item to know what is intended.

F. No correct answer to this item.

G. Requires too much time for the student to answer this question. (Indicate how much.)

H. Please revise as indicated on the form or on the attached copy of the test.

I. More than one correct answer for this item. (Please list.)

J. Too much teacher-time to correct. (Indicate how much.)

K. Illustrations are incorrect or ambiguous. (Indicate problem.)

L. Item seems too difficult for the objective. (Why?)

M. TLU does not prepare the student adequately.

Figure 7

PORTION OF STUDENT'S TLU EVALUATION FORM

1. What statements below best describe the reason you chose this TLU?

   A. It was the easiest.
   B. It uses materials I like.
   C. It has the most interesting activities.
   D. My teacher recommended it.
   E. Other students recommended it.
   F. It was the only one available.

2. Which one statement best describes the time you spent on this TLU?

   A. More than 15 hours
   B. 11 — 15 hours
   C. 6 — 10 hours
   D. 1 — 5 hours
   E. Challenged test without studying the TLU

3. What statements below describe the help you received on the TLU?

   A. I received no help. (Circle Question Number 4, Item G, also.)
   B. I received help from another student.
   C. I received help from my teacher.
   D. I received help from my parent(s).
   E. I received help from others.

5. Did you use more than one TLU for this module?

   A. Yes.
   B. No.
   C. If you answered, "Yes," list on the "Student TLU Form" the additional TLU's you used.

illustrates the categories of information collected from students. Again, as with the questionnaire-type data collected from teachers, this information can be used along with the hard data as a vehicle for the improvement of the instructional program. Finally, project personnel working on the improvement of the instructional program make periodic visits to Project PLAN schools to maintain a realistic context within which to interpret data collected.

To summarize the types of data used in the improvement of the PLAN instructional program, we have seen that four basic types of objective data related to specific objectives are (1) item statistics of module tests indicating the number of students selecting each option, (2) frequency distribution of student scores on module tests on an objective-by-objective basis, (3) frequency distribution of student scores on module tests on an objective-by-objective-by-TLU basis, and (4) cross-validation data on parallel items administered at various time intervals. To supplement this data, subjective teacher judgments (TLU information, evaluation information) and student judgments are recorded. Let us now consider how these data are used in the actual improvement of instructional modules.

Refinement of a Science Module

To illustrate some of the procedures involved in the improvement of PLAN modules, the improvement of the module, "Introduction to Matter," will be discussed. The module can be classified in the general area of physical science and was developed for students in the fourth through sixth grade range. The module

Figure 8

Objective Code	No. of Items Correct	Frequency	Percent	Cumulative Percent
3013	00	1	0.7	0.7
	01	2	1.5	2.2
	02	1	0.7	2.9
	03	4	2.9	5.8
	04	129	94.2	100.0
TOTALS		137	100.0	
MEAN				3.88
STANDARD DEVIATION				0.54

Figure 9

Objective Code	No. of Items Correct	Frequency	Percent	Cumulative Percent
3011	00	0	0.0	0.0
	01	12	8.8	8.8
	02	10	7.3	16.1
	03	26	19.0	35.1
	04	23	16.8	51.9
	05	24	17.5	69.4
	06	42	30.7	100.1
TOTALS		137	100.1	
MEAN				4.19
STANDARD DEVIATION				1.62

contained nine objectives, although only four will be discussed here. At the time the module was revised, 137 students had completed it.

Figure 8 shows the distribution of student responses on a four-item evaluation of one of the objectives, "Tell which substances are gases, liquids, and solids when given a list of ten substances." It can be seen that of the 137 students attempting the items, 129 had all items correct. The evaluation items related to this objective are clearly acceptable. For these items the student was given a list of substances and was asked to designate whether they were solid, liquid, or gas. Since the test items do match the objectives, and since students were performing at an acceptable level on the objective, revision of this objective and its related learning activities and test items was not called for.

Consider another objective for this same module. With this one there was a considerable amount of difficulty. The objective was, "Write an acceptable scientific definition of the following words: matter, molecules, atoms, electrons, protons, and nucleus." Figure 9 shows the distribution of student responses on the six items covering this objective. Since the distribution of responses on this objective reveals that an unsatisfactory number of students has achieved the objective, examination of the test items for this objective as well as the learning activities was called for — and revealed the problem. First, though the objective clearly calls for a recall of information, all six test items call for recognition. Although it is normally assumed that if the student can recall information, he should also be able to recognize the same information,

recall and recognition are not the same. Therefore, the test items call for a different type of behavior than the objective. A much more serious problem is revealed by the learning activities given the students. Students were directed to read material in one or more of four textbooks. In reviewing these pages assigned to the student, it was discovered that in one book (5) there is the sentence, "All matter is made up of tiny particles called molecules," and in another book (4), there is the statement, "All matter is made up of tiny particles called atoms." Thus, in two separate books, the student is given two apparently conflicting statements and then expected to respond correctly on the criterion test.

A different problem was encountered in the same module with two objectives which were ultimately combined into one. The two original objectives were, "State the difference between evaporation and condensation, explaining how heat is involved in these processes," and, "Infer a relationship between melting and freezing after viewing a diagram." The distributions of student responses on the two objectives is shown in Figure 10. Neither of these shows a particularly good distribution of student responses. Examination of the objectives themselves indicates that though both are trying to get at different aspects of the overall problem, both are vague and poorly stated. It is difficult to know, for example, what a student will be doing when he is inferring. In this case, the objectives were in need of repair, and so one was written in a manner which tries to retain the desirable features of both of the original objectives. The new objective is, "Given two states of matter, tell whether heat must be added

Figure 10

Objective Code	No. of Items Correct	Frequency	Percent	Cumulative Percent
3015	00	22	16.1	16.1
	01	42	30.7	46.8
	02	73	53.3	100.1
TOTALS		137	100.1	
MEAN				1.37
STANDARD DEVIATION				0.74

Objective Code	Number of Items Correct	Frequency	Percent	Cumulative Percent
3016	00	39	28.5	28.5
	01	98	71.5	100.0
TOTALS		137	100.0	
MEAN				0.72
STANDARD DEVIATION				0.45

or taken away to go from the first to the second state, and give the name of the process."

In addition to improvements made in the substance of the module, changes have also been made in the format of presentation. The original form of the module first listed all objectives and then all the steps for the achievement of those objectives. (Figure 11) However, the specific relationship between the objectives and the steps was not clearly delineated. This caused two problems. First, a student was not always aware of why he was going through certain steps. Although both objectives and learning activities were presented to him, the separation of the two and the lack of identification of the relationship of the two did not make the objectives as functional as desired. A second problem occurred when a student finished a module but had not mastered all objectives, since when objectives and learning activities are not closely related, it is extremely difficult for a student to know where to return to study. Therefore, a student might restudy the entire module, much of which he has already mastered, or he might engage in activities totally unrelated to his need. To remedy this situation, the module was rearranged so that the objectives and their related learning activities are specifically identified. (Figure 12) This improved clarity has proved to be of great benefit to students and teachers, and in developmental work, it is much easier to monitor the work of a writer when the relationship between the objective and the learning activities must be made explicit.

Figure 11

OBJECTIVES

INTRODUCTION TO MATTER

THE STUDENT WILL BE ABLE TO:

3011 Write an acceptable scientific definition of the following words: matter, molecules, atoms, electrons, protons, and nucleus.

3012 List the three states of matter with three examples of each.

3013 Tell which substances are gases, liquids, and solids when given a list of ten substances.

3014 State, after experimenting, that matter can change state, and cite two examples.

3015 State the difference between evaporation and condensation, explaining how heat is involved in these processes.

ITEM	USE	DO	SELF-CHECK	DONE
1.	What is Matter? by Posin. Instructional Guide.	Review material from What is Matter, pp. 1-23. Read the I.G. Answer the following in your notebooks: 1. Tell what matter is. 2. List the three states of matter. 3. Define matter (See IG.)		
2.	Science 4, Laidlaw. Science notebook.	Read pp. 197-206. Do the following activities in your notebook. 1. Make a chart showing the three states of matter and give three examples of each. 2. Explain how you can tell if a fluid is a liquid or a gas. Check your answer with the material on pp. 199-201. 3. Study the picture on p. 200. State briefly in a paragraph what happened to the iodine crystals. 4. Define and give two everyday examples of evaporation and condensation. Tell how they are related. 5. Draw a diagram showing how melting and freezing are related.	Are clothes drying on a line an example of evaporation? Explain. Check pp. 205-206.	

or taken away to go from the first to the second state, and give the name of the process."

In addition to improvements made in the substance of the module, changes have also been made in the format of presentation. The original form of the module first listed all objectives and then all the steps for the achievement of those objectives. (Figure 11) However, the specific relationship between the objectives and the steps was not clearly delineated. This caused two problems. First, a student was not always aware of why he was going through certain steps. Although both objectives and learning activities were presented to him, the separation of the two and the lack of identification of the relationship of the two did not make the objectives as functional as desired. A second problem occurred when a student finished a module but had not mastered all objectives, since when objectives and learning activities are not closely related, it is extremely difficult for a student to know where to return to study. Therefore, a student might restudy the entire module, much of which he has already mastered, or he might engage in activities totally unrelated to his need. To remedy this situation, the module was rearranged so that the objectives and their related learning activities are specifically identified. (Figure 12) This improved clarity has proved to be of great benefit to students and teachers, and in developmental work, it is much easier to monitor the work of a writer when the relationship between the objective and the learning activities must be made explicit.

Figure 12

Step 4. OBJECTIVE
Given two states of matter, tell whether heat must be *added* or *taken away* to go from the first to the second state and give the name of the process.

Example: To go from SOLID to LIQUID must heat be added or taken away? What is the process called?

USE	DO
	(a) Ice, water, and steam are all made of water molecules. How are the substances different? Add them to the chart you made in Step 3(b).
What is Matter	(b) Review pp. 16-18.
	(c) Melt an ice cube. How did you do it? Evaporate the water you obtained from the melted ice cube. How did you do it? The results of your experiment could be summarized as follows: $\text{ice} \xrightarrow[\text{melting}]{+\text{H}} \text{water} \xrightarrow[\text{evaporation}]{+\text{H}} \text{steam}$
Instructional Guide	(d) Study and do Part I of the IG.
	(e) Check your answers in Part II of the IG.
science notebook	(f) In your notebook give as many every-day examples as you can of evaporation, condensation, melting, and freezing.

Refinement of a Reading Module

The work done on the reading material under consideration illustrates the effect of sequencing learning activities. Figure 13 illustrates the original teaching-learning unit. This teaching-learning unit relies heavily on the Sullivan reading materials but supplements these materials with a variety of activities. It can be seen from Figure 13 that the student is playing games, reading materials, writing, listening, looking at film strips. Students worked through the module at a reasonable pace and mastered the reading objective at the close of the work. However, teachers were able to identify a small group of students who were not succeeding with these materials. To ascertain the problems of the students who were having learning difficulties, special project personnel were assigned to monitor closely their activities.

After observing students, it was hypothesized that the sequencing or possibly the chunking of learning activities was inappropriate for these students as they seemed to have had a great deal of difficulty concentrating on the sixteen-page block of reading required in Activity f. Could it be that breaking this block of reading into smaller parts and interspersing this reading with the other related activities would solve the problem for these students? Did students need a more structured way of keeping track of what they had read? Figure 13 shows we had provided a "Done" column where the student can check off the activities he has completed. This aid, however, did not seem to be sufficient for these students that were having learning difficulties.

Figure 13

Lesson 2 (continued)

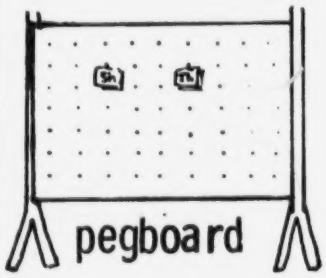
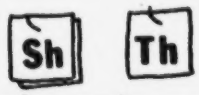
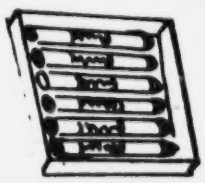
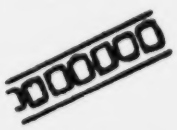
	USE	DO	DONE
e.	 pegboard  pegboard cards	play 4	
f.	Sullivan Book 1 pages 109 to 124 pencil	read write 6	
g.	Listen and Do 4 - D  crayons pencil	listen Draw a line. draw 1	
h.	 Filmstrip D Tape D	look listen 1	

Figure 14 illustrates a portion of the modified version of the teaching-learning unit. The essential differences between the modified version and the original version are (1) reading passages have been broken down into smaller units; (2) smaller units of reading have been interspersed with the other activities; and (3) a more structured format for recording the pages read is provided in the "Done" column. It should be emphasized that there were no content or activity changes from the first teaching-learning unit to the second. Everything that is included in the first teaching-learning unit is also included in the second, and no new learning activities have been added. The only modifications that have been made are in the sequencing and format of presentation. But now the students who had previously been having learning difficulties are able to proceed in a satisfactory manner using the refined materials. It should be pointed out that this work was carried out on a small sample of students, and, at this point in time, the results should not be considered generalizable to a wider target population. It is hoped that further work on the sequencing of instructional materials will provide us with more generalizable results.

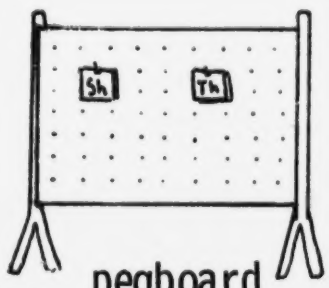
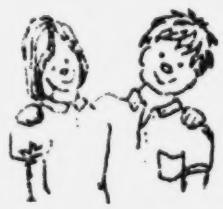
Summary

The paper has presented the general rationale and types of data utilized in the improvement of individualized instructional materials within Project PLAN. Illustrations of both hard and soft data were presented. To illustrate further the techniques utilized, an illustration of the revision of a science module was presented. This revision depended very heavily on the hard data. On the

Figure 14

11-052-7S | Sullivan Book 1 (2) | (0,00)

Lesson 2 (continued)

	USE	DO	DONE
	T — TM, pp. 231-236, mint, fish, ship		
f.	Book 1 — Sullivan Book 1; pencil	Read pages 115 to 118.	115 ☐ 116 ☐ 117 ☐
g.	 pegboard; Sh Th — pegboard cards	Play.	4
h.	Book 1 — Sullivan Book 1; pencil	Read pages 118 to 120.  Read page 120. My partner is _____	118 ☐ 119 ☐ 120 ☐

other hand, an illustration was given of the refinement of a reading module during which the dependence was more on soft data. We believe that this analysis of the instructional program of Project PLAN will continue to improve educational results.

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